CLAIMS

What is claimed is:

1   1.   A computer aided design (CAD) system for designing high performance circuits,
2   said CAD system comprising:
3   a graphical user interface (GUI) having input fields including conductor and
4   dielectric input fields; and
5   a field solver using conductor and dielectric inputs to determine circuit
6   interconnection electric parameters.
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1   2.   A CAD system as in claim 1, wherein said input fields are geometric and property
2   specification input fields.
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1   3.   A computer aided design (CAD) system comprising:
2   a template generation engine generating templates from interconnect
3   configuration files;
4   a field solver generating broadband passive element relationships from said
5   templates;
6   a circuit builder generating circuit description files from device technology
7   models and said broadband passive element relationships; and
8   a simulator simulating circuit responses for transmission line models from said
9   circuit description files.
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1   4.   A CAD system as in claim 3, further comprising:
2   a geometry and material definition module receiving process description and
3   generating said interconnect configuration files.
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1   5.   A CAD system as in claim 4, wherein process inputs are varied in said process
2   description through a graphical user interface (GUI).

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6.   A CAD system as in claim 5, wherein conductor geometric and property specifications and dielectric geometric property specifications for interconnect wiring layers are provided to said GUI.

7.   A CAD system as in claim 5, wherein said interconnect configuration files include two dimensional inductance templates and three dimensional per unit capacitance values for interconnect wiring layers.

8.   A CAD system as in claim 5, wherein templates include two dimensional (2D) inductance templates and three dimensional (3D) capacitance templates.

9.   A CAD system as in claim 5 wherein said 2D and 3D capacitance templates are combined to provide multiple dielectric stack inclusion in capacitance calculation.

10.   A CAD system as in claim 5, wherein said broadband passive relationships include frequency dependent resistance and inductance for selected signal conductors.

11.   A CAD system as in claim 5 wherein two dimensional and three dimensional resistance and inductance templates are combined to provide wide-band circuit parameters.

12.   A CAD system as in claim 5 wherein said template generation engine generates two dimensional (2D) broadband inductance templates for lines in a first layer, said 2D broadband inductance templates including far reference conductors in said first layer and in at least each of a layer above and below said first layer.

13.   A CAD system as in claim 5 wherein said template generation engine generates three dimensional (3D) templates for capacitance calculation in a signal layer, said 3D

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3   templates including variable orthogonal wiring density in layers above and below said

4   signal layer.

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1   14.   A CAD system as in claim 5, wherein said GUI displays simulated said circuit

2   responses.

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1   15.   A CAD system for designing high performance circuits, said CAD system

2   comprising:

3   a graphical user interface (GUI) having input fields including conductor and

4   dielectric input fields;

5   a geometric conductor configuration module combining said conductor and

6   dielectric field inputs, said geometric conductor configuration module producing an

7   interconnect structure representation bounded by electromagnetic boundary conditions;

8   and

9   a field solver using produced said interconnect structure and the electromagnetic

10   boundary conditions to determine interconnection structure parameters.

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1   16.   A CAD system as in claim 15, wherein said input fields are geometric and

2   property specification input fields.

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1   17.   A CAD system, as in claim 16, wherein said geometric conductor configuration

2   module produces a two dimensional (2D) conductor representation.

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1   18.   A CAD system, as in claim 17, wherein said 2D conductor representation is a 2D

2   capacitive representation.

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1   19.   A CAD system, as in claim 18, wherein said 2D capacitive representation further

2   includes a conductance representation of dielectric properties.

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1   20.   A CAD system, as in claim 19, wherein said 2D representation process is a 2D
2   inductive representation.

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1   21.   A CAD system, as in claim 20, wherein said 2D inductive representation further
2   includes a resistive representation of conductors and dielectric properties.

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1   22.   A CAD system, as in claim 21, wherein said 2D inductive representation further
2   includes frequency dependent inductance effects.

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1   23.   A CAD system, as in claim 22, wherein the frequency dependent inductance
2   effects include skin effects, proximity effects and return path proximity effects.

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1   24.   A CAD system, as in claim 23, wherein said geometric conductor configuration
2   module produces a three dimensional (3D) conductor representation.

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1   25.   A CAD system, as in claim 24, wherein said 3D conductor representation is a 3D
2   capacitive representation.

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1   26.   A CAD system, as in claim 24, wherein said 3D conductor representation is a 3D
2   inductive representation.

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1   27.   A CAD system as in claim 24 that generates circuit netlists for simulation, said
2   netlists providing an equivalent synthesized circuit based representation of frequency-
3   dependent net behavior.

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1   28.   A CAD system as in claim 24 that generates parameterized netlists.